

## WHAT IS CLAIMED IS:

1. A method for automatically determining the location of a shutter in a system having an illumination source, an optical imager and a mechanized shutter, comprising  
5 the steps of:
  - placing the shutter at a first position and forming a first image through the shutter;
  - placing the shutter at a second position and forming a second image through the shutter;
  - obtaining a first function by summing the pixels of the first image in a direction  
10 perpendicular to the shutter's direction of motion;
  - obtaining a second function by summing the pixels of the second image in a direction perpendicular to the shutter's direction of motion;
  - obtaining a difference function by subtracting the first function from the second function, so as to obtain a recognizable peak in said difference function.
- 15 2. The method of claim 1, further comprising the step of taking the derivative of the difference equation.
3. The method of claim 1, further comprising adjusting one of (i) gain of said imager  
20 and (ii) intensity of said illumination source, so as to obtain an acceptable signal to noise ratio.
4. The method of claim 3, wherein said adjusting comprises the step of:

examining the quality of said peak and if the quality is not acceptable: checking whether a gain limit has been reached and, if so, increasing the intensity of said illumination source; otherwise increasing the gain of said imager.

- 5     5.     A system for automatically determining the location of a shutter, comprising: an illumination source;
- an optical imager;
- a mechanized shutter;
- a controller comprising a shutter controller preprogrammed to perform the step
- 10   comprising:
- placing the shutter at a first position and forming a first image through the shutter;
- placing the shutter at a second position and forming a second image through the shutter;
- obtaining a first function by summing the pixels of the first image in a direction
- 15   perpendicular to the shutter's direction of motion;
- obtaining a second function by summing the pixels of the second image in a direction perpendicular to the shutter's direction of motion;
- obtaining a difference function by subtracting the first function from the second function, so as to obtain a recognizable peak in said difference function.

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6.     The system of claim 5, wherein said shutter controller is further programmed to perform the step comprising: taking the derivative of the difference function.

7. The system of claim 5, further comprising an automatic gain/illumination controller.

8. The system of claim 7, wherein said gain/illumination controller is

5 preprogrammed to perform the steps comprising: examining the quality of said peak and if the quality is not acceptable: checking whether a gain limit has been reached and, if so, increasing the intensity of said illumination source; otherwise increasing the gain of said imager.

10 9. A controller for determining and controlling a motion of a mechanized shutter, said controller performing the operations comprising:

receiving a first data set corresponding to a first image obtained through a first position of the shutter;

receiving a second data set corresponding to a second image obtained through a  
15 second position of the shutter;

obtaining a first function by performing an arithmetic operation on the first data set;

obtaining a second function by performing an arithmetic operation on the second data set;

20 obtaining a difference function by subtracting the first function from the second function, so as to obtain a recognizable peak in said difference function.

10. The controller of claim 9, further performing the operation comprising: taking the derivative of the difference function.

11. The controller of claim 9, further performing the operation comprising adjusting  
5 one of (i) gain of an imager and (ii) intensity of an illumination source, so as to obtain an acceptable signal to noise ratio.

12. The controller of claim 11, wherein the operation of adjusting comprises the step of:

10 examining the quality of said peak and if the quality is not acceptable: checking whether a gain limit has been reached and, if so, increasing the intensity of said illumination source; otherwise increasing the gain of said imager.